Ecological site R006XA218OR
Juniper Sandy Slopes
8-11 PZ

Last updated: 4/01/2025
Accessed: 08/31/2026

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 006X–Cascade Mountains, Eastern Slope

Stretching from northern Washington to southern Oregon, MLRA6 encompasses the mountain slopes, foothills, elevated plateaus and valleys on the eastern slopes of the Cascade mountains. This MLRA is a transitional area between the Cascade Mountains to the west and the lower lying Columbia Basalt Plateau to the east. Situated in the rain shadow of the Cascade Crest, this MLRA receives less precipitation than portions of the cascades further west and greater precipitation than the basalt plateaus to the east. Geologically, the majority of the MLRA is dominated by Miocene volcanic rocks, while the northern portion is dominated by Pre-Cretaceous metamorphic rocks and the southern portion is blanketed with a thick mantle of ash and pumice from Mount Mazama. The soils in the MLRA dominantly have a mesic, frigid, or cryic soil temperature regime, a xeric soil moisture regime, and mixed or glassy mineralogy. They generally are moderately deep to very deep, well drained, and loamy or ashy. Biologically, the MLRA is dominated by coniferous forest, large expanses of which are dominated by ponderosa pine, Douglas-fir or lodgepole pine. Areas experiencing cooler and moister conditions include grand fir, white fir, and western larch while the highest elevations include pacific silver fir, subalpine fir and whitebark pine. Economically, timber harvest and recreation are important land uses in these forests. Historically, many of these forests would have experienced relatively frequent, low and mixed severity fire favoring the development of mature forests dominated by ponderosa pine or Douglas-fir. In the southern pumice plateau forests, less frequent, higher severity fire was common and promoted the growth of large expanses of lodgepole pine forests.

LRU notes

This unit is characterized by a landscape of basalt terraces, abandoned lakebeds and dunes where exceedingly dry ponderosa pine – western juniper forests occur. These forests are largely geographically confined to the Lost Forest Research Natural Area, and despite receiving less than 11 inches of annual precipitation, persist among a desert shrubland due to unique soil characteristics. Here, deep eolian deposits of ash and pumice increase water holding capacity relative to nearby soils. Geologically, these deposits are underlain by Pliocene basalt from the High Cascades volcanic province. Botanically, these forests share characteristics with other dry pine forests as well as the nearby shrub steppe. Common members include, antelope bitterbrush, big sagebrush, needle and thread, Indian ricegrass, creeping wildrye and granite prickly gilia. The climate of this unit is cool and very dry with a soil climate defined by a frigid temperature regime and an aridic moisture regime. The historical fire regime of this site is likely similar to other very dry ponderosa pine communities, with moderately frequent, low severity fire common.

Ecological site concept

This site represents a western juniper (Juniperus occidentalis) dominated woodland occurring at the northwestern edge of the Great Basin. In reference condition, this site supports and old growth juniper woodland with an herbaceous community dominated by Indian ricegrass (Achnatherum hymenoides) and needle and thread (Hestperostipa comata). Deep deposits of volcanic ash and pumice create the conditions for the plant community of this site and infrequent fire due to fuel limitations likely allowed juniper to persist historically. The influence of ash in these soils increases water holding capacity and bolsters site resilience during drought. This is a provisional ecological site and is subject to extensive review and revision before final approval. All data herein should be considered provisional and contingent upon field validation prior to use in conservation planning.

Associated sites

R006XA214OR	**Forested Pumice Dunes 8-11 PZ** Lower elevation

Similar sites

R006XA214OR	**Forested Pumice Dunes 8-11 PZ** Lower elevation
R006XA216OR	**Forested Shrubby Dunes 8-11 PZ** More gentle slopes, 2-20% rather than 15-35%
R006XA219OR	**Juniper Dunes 8-10 PZ** Lower elevation

Table 1. Dominant plant species

Tree	(1) *Juniperus occidentalis*
Shrub	Not specified
Herbaceous	(1) *Hesperostipa comata ssp. comata* (2) *Achnatherum hymenoides*

Physiographic features

This site is found on dunes and sand sheets on escarpments in hill and tableland landscapes. Slopes are commonly 15 to 35 percent and elevations range from 4,400 to 4,700 feet (1,350 to 1,450 meters). This site occurs on all aspects. This site is not subject to ponding or flooding and no water table is present.

Table 2. Representative physiographic features

Landforms	(1) Tableland > Escarpment (2) Tableland > Dune (3) Tableland > Sand sheet
Elevation	1,340 – 1,430 m
Slope	20 – 40 %
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

This site is characterized by hot dry summers and cold wet winters. Precipitation, largely in the form of rain and snow, ranges from 8-11 inches, averaging 10 inches annually. Frost-free days range from 85 to 95 and the freeze-free period ranges from 120 to 135 days. The soil temperature regime is frigid and the soil moisture regime is aridic. The graphs below are populated from the closest available weather station to representative site locations and are provided to indicate general climate patterns.

Table 3 Representative climatic features

Frost-free period (characteristic range)	90-100 days
Freeze-free period (characteristic range)	120-140 days
Precipitation total (characteristic range)	200-280 mm
Frost-free period (average)	90 days
Freeze-free period (average)	130 days
Precipitation total (average)	250 mm

- (1) THE POPLARS [USC00358420], Silver Lake, OR

Influencing water features

This site is not influenced by water from a wetland or stream.

Wetland description

N/A

Soil features

Soils that typify this site concept are deep to very deep ashy loamy sand over sandy loam. These soils were formed in eolian deposits of pumice and volcanic ash, allowing for increased water holding capacity and the ability to sustain ponderosa pine unlike adjacent desert shrub communities. These soils are somewhat excessively to excessively drained and have moderately rapid to rapid permeability. Soils on this site are classified into the Psamments great group, which are largely unconsolidated sand deposits with little soil development.

Table 4. Representative soil features

Parent material	(1) Eolian sands – pumice (2) Volcanic ash
Surface texture	(1) Ashy loamy sand
Family particle size	(1) Ashy
Drainage class	Somewhat excessively drained to excessively drained

Permeability class	Moderately rapid to rapid
Depth to restrictive layer	100 – 200 cm
Soil depth	100 – 200 cm
Surface fragment cover <=3"	0 – 90 %
Surface fragment cover >3"	0 – 90 %
Available water capacity (0-101.6cm)	7.11 – 12.7 cm
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10
Subsurface fragment volume <=3" (10.2-152.4cm)	0 – 30 %
Subsurface fragment volume >3" (10.2-152.4cm)	0 – 20 %

Ecological dynamics

Reference Plant community:

In reference condition, this site supports a community of old growth western juniper, Indian ricegrass (Achnatherum hymenoides) and needle and thread (Hestperostipa comata). These vegetated dunes and sandy slopes are highly erodible and may shift without stabilizing vegetative cover. A comprehensive forest health study of the nearby Lost Forest Research Natural Area was undertaken by the USFS in 2007. On similar landforms and ecological sites, researchers recorded an abundance of western juniper greater than 150 years old, with considerable numbers of younger trees that were less than 150 years old (40 and 60 percent of all trees recorded, respectively) (Chadwick and Eglitis 2007). This suggests that this is a persistent juniper site, yet infill of younger trees may be greater than it was historically, possibly due to grazing practices and suppression of fire.

Disturbance:

Grazing disturbance may alter the composition of the herbaceous layer and favor an increase in bottlebrush squirreltail (Elymus elymoides) at the expense of Indian ricegrass. According to research on the nearby Lost Forest Research Natural Area, despite a high frequency of lightning strikes, research suggests that fire was likely not a common disturbance agent in this forest due to low fuel loads and continuity (Chadwick and Eglitis 2007). According to the best available knowledge of similar systems, the fire regime is likely comparable to other western juniper woodland plant communities characterized by moderately frequent, mixed severity fire. This system is approximated by the Landfire biophysical setting: 0710170 Columbia Plateau Western Juniper Woodland and Savanna, fire regime group 3: 35 to 100 plus year frequency, mixed severity) (Landfire 2007). This suggests that this is a persistent juniper site with historic old growth potential, yet infill of younger trees may be greater than it was previously, possibly due to grazing practices and suppression of fire.

Given that this site occupies a limited geographic area, little is known about the plant community dynamics over time, therefore the model

below represents a generalized and simplified understanding of community response to disturbance. Hotter and drier summer conditions are expected to increase with a changing climate and have historically been associated with fires of greater extent and severity in the Pacific Northwest (Halofsky et al. 2020). When combined with the interacting impacts of fire suppression, drought, and insect outbreaks, it is possible that this ecological system will experience unpredictable ecosystem shifts and additional alternative states. As our understanding of these systems evolves and this site is updated in future iterations, descriptions will include more thorough treatments of disturbance and ecological change.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**grass and grasslike plants**			303-493	
	needle and thread	hecoc8	*Hesperostipa comata ssp. comata*	135-202	–
	Indian ricegrass	achy	*Achnatherum hymenoides*	135-202	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	11-34	–
	squirreltail	elel5	*Elymus elymoides*	11-34	–
	beardless wildrye	letr5	*Leymus triticoides*	6-20	–
2	**other perennial grasses**			11-34	
Forb					
3	**forbs**			11-28	
	granite prickly phlox	lipu11	*Linanthus pungens*	6-11	–
	curvepod milkvetch	ascu4	*Astragalus curvicarpus*	6-11	–
4	**other perennial forbs**			11-34	
Shrub/Vine					
5	**shrubs**			28-62	
	basin big sagebrush	artrt	*Artemisia tridentata ssp. tridentata*	11-34	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	6-11	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	6-11	–
6	**other perennial shrubs**			6-34	
Tree					
7	**trees**			67-135	
	western juniper	juoc	*Juniperus occidentalis*	67-135	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Inventory data references

Information presented here has been derived from NRCS data. Field observations from range trained personnel were also used. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

References

. (Date accessed). **Fire Effects Information System**. http://www.fs.fed.us/database/feis/.

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Other references

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Contributors

JPR
Andrew Neary - 2020/2021 PES update of draft site

Approval

Kirt Walstad, 4/01/2025

Acknowledgments

Development of this site as a range site was based on field data collection completed in 1998 by the Burns ESI team. It was revised and updated with information regarding ecological dynamics in 2021.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	02/14/2025
Approved by	
Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

2. **Presence of water flow patterns:**

   _____

3. **Number and height of erosional pedestals or terracettes:**

   _____

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

   _____

5. **Number of gullies and erosion associated with gullies:**

   _____

6. **Extent of wind scoured, blowouts and/or depositional areas:**

   _____

7. **Amount of litter movement (describe size and distance expected to travel):**

   _____

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

   _____

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

   _____

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

    _____

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

    _____

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
